CLAIMS

1.   A gas mixture temperature estimation method for an internal combustion engine, the method comprising:

  estimating a temperature of a gas mixture produced through mixing of fuel injected into a combustion chamber of the internal combustion engine and a cylinder interior gas, which is a gas having been taken into the combustion chamber, under the assumption that the gas mixture stagnates in a generally annular configuration in the vicinity of a side wall of the combustion chamber, and heat transfer occurs between the gas mixture and an object or substance existing around the gas mixture during a period in which the gas mixture stagnates.

2.   A gas mixture temperature estimation method for an internal combustion engine according to claim 1, wherein the temperature of the gas mixture is estimated under the assumption that the stagnation of the gas mixture occurs after the gas mixture reaches an inner wall surface of the combustion chamber.

3.   A gas mixture temperature estimation method for an internal combustion engine according to claim 1, wherein the object or substance existing around the gas mixture comprises the wall of the combustion chamber in contact with the gas mixture and the cylinder interior gas in contact with the gas mixture.

4.   A gas mixture temperature estimation method for an internal

combustion engine according to claim 2, wherein the object or substance existing around the gas mixture comprises the wall of the combustion chamber in contact with the gas mixture and the cylinder interior gas in contact with the gas mixture.

5.   A gas mixture temperature estimation method for an internal combustion engine according to claim 3, wherein the quantity of heat transferred between the gas mixture and the wall of the combustion chamber is calculated on the basis of an area of contact and a thermal conductivity between the gas mixture and the wall of the combustion chamber; and the quantity of heat transferred between the gas mixture and the cylinder interior gas is calculated on the basis of an area of contact and a thermal conductivity between the gas mixture and the cylinder interior gas.

6.   A gas mixture temperature estimation method for an internal combustion engine according to claim 4, wherein the quantity of heat transferred between the gas mixture and the wall of the combustion chamber is calculated on the basis of an area of contact and a thermal conductivity between the gas mixture and the wall of the combustion chamber; and the quantity of heat transferred between the gas mixture and the cylinder interior gas is calculated on the basis of an area of contact and a thermal conductivity between the gas mixture and the cylinder interior gas.

7.   A gas mixture temperature estimation method for an internal combustion engine according to claim 5, wherein the thermal conductivity between the gas mixture and the wall of the combustion chamber and the

thermal conductivity between the gas mixture and the cylinder interior gas are individually changed in accordance with pressure of the cylinder interior gas.

8. A gas mixture temperature estimation method for an internal combustion engine according to claim 6, wherein the thermal conductivity between the gas mixture and the wall of the combustion chamber and the thermal conductivity between the gas mixture and the cylinder interior gas are individually changed in accordance with pressure of the cylinder interior gas.

9. A gas mixture temperature estimation method for an internal combustion engine according to claim 5, wherein the thermal conductivity between the gas mixture and the wall of the combustion chamber is changed in accordance with a value representing the speed of a flow of the gas mixture generated by a swirl.

10. A gas mixture temperature estimation method for an internal combustion engine according to claim 6, wherein the thermal conductivity between the gas mixture and the wall of the combustion chamber is changed in accordance with a value representing the speed of a flow of the gas mixture generated by a swirl.

11. A gas mixture temperature estimation method for an internal combustion engine according to claim 7, wherein the thermal conductivity between the gas mixture and the wall of the combustion chamber is

changed in accordance with a value representing the speed of a flow of the gas mixture generated by a swirl.

12.   A gas mixture temperature estimation method for an internal combustion engine according to claim 8, wherein the thermal conductivity between the gas mixture and the wall of the combustion chamber is changed in accordance with a value representing the speed of a flow of the gas mixture generated by a swirl.